Claims

1. A peptide, being the N-terminal fragment of human proinsulin C-peptide, and having the sequence

E A E D L Q V G Q V E L (SEQ ID. NO. 2)
1 2 3 4 5 6 7 8 9 10 11 12

or a fragment or peptide derivative thereof retaining the functional ability of said N-terminal fragment to contribute to C-peptide activity, wherein said fragment or peptide derivative comprises two acidic amino acid residues and is capable of adopting a conformation where said two acidic amino acid residues are spatially separated from one another by a distance of 9-14 Å between the α-carbons thereof; and wherein said peptide derivative does not include native C-peptide of any species nor human C-peptide 1-15, 1-24 or 1-26 or rat C-peptide 1-26.

2. A peptide having an amino acid sequence comprising (i) the N-terminal fragment of human insulin C-peptide having the sequence

E A E D L Q V G Q V E L (SEQ ID NO. 2)

or (ii) a fragment or peptide derivative of amino acid sequence SEQ ID NO. 2 retaining the functional ability of said N-terminal fragment to contribute to C-peptide activity, wherein said fragment or peptide derivative comprises two acidic amino acid residues and is capable of adopting a conformation wherein said two acidic amino acid residues are spatially separated from one another by a distance of 9-14 Å between the α-carbons thereof;

said peptide having C-peptide activity, but not including native C-peptide of any species nor human C-

peptide 1-15, 1-24 or des 13-17.

3. A peptide according to claim 1 or 2 having the formula (I):

$$X_n - Y - X_m - Y - X_p \qquad (I)$$

wherein

X is any amino acid;

Y is an acidic amino acid;

n = 0-6;

m = 5-9; and

p = 0-6.

4. The peptide of claim 3, wherein m is 5-8.

5. The peptide of claim 3 or 4, wheren m is 7.

6. The peptide of any one of claims 1 to 5 which is capable of adopting an α-helical conformation.

7. The peptide of claim 6 wherein said two acidic amino acid residues are located on one side of said α-helix.

8. The peptide according to claim 6 or 7 which is a peptide derivative of SEQ. ID. No. 2 but comprises further amino acid residues of the N-terminal fragment of C-peptide (SEQ. ID. No. 2) which are located on one side of said α-helix such that the helix presents a conserved surface.

9. The peptide of claim 8 wherein said conserved surface comprises Gln 6 and/or Val 7 in addition to said two acidic residues.

10. The peptide of any one of claims 1 to 9 further comprising a third acidic amino acid residue capable of

interacting with said two acidic amino acid residues.

11. The peptide of any one of claims 1 to 10 wherein at least one of the acidic amino acid residues is Glu.

12. The peptide of claim 11 wherein said two acidic amino acid residues are Glu.

13. A salt, solvate or ester of the peptides of any one of claims 1 to 12.

14. The peptide of any preceding claim wherein said two acidic amino acid residues are spatially separated from one another by a distance of 10-13 Å between the α-carbons thereof.

15. A peptide, being the N-terminal fragment of human insulin C-peptide and having the sequence

E A E D L Q V G Q V E L (SEQ ID NO. 2)

or a fragment or peptide derivative thereof retaining the functional ability of said N-terminal fragment to contribute to C-peptide activity, wherein said fragment or peptide derivative comprises two acidic amino acid residues and is capable of adopting a conformation where said two acidic amino acid residues are spatially separated from one another by a distance of 9-14 Å between the α-carbons thereof, wherein said derivative does not include native C-peptide of any species nor human C-peptide 1-15 or 1-24, for use in therapy.

16. A peptide having an amino acid sequence comprising (i) the N-terminal fragment of human insulin C-peptide having the sequence

E A E D L Q V G Q V E L (SEQ ID NO. 2)

or (ii) a fragment or peptide derivative of amino acid sequence SEQ ID NO. 2 retaining the functional ability of said N-terminal fragment to contribute to C-peptide activity, wherein said fragment or peptide derivative comprises two acidic amino acid residues and is capable of adopting a conformation where said two acidic amino acid residues are spatially separated from one another by a distance of 9-14 Å between the α-carbons thereof;

said peptide having C-peptide activity, but not including native C-peptide of any species nor human C-peptide 1-15, 1-24 or des 13-17 for use in therapy

17. The peptide of claim 15 or 16, wherein said therapy is C-peptide based therapy.

18. The peptides of any one of claims 15 to 17, used in conjunction with C-peptide or a C-terminal fragment of C-peptide.

19. The peptide of any one of claims 15 to 17, wherein said peptide further comprises a C-terminal fragment of C-peptide.

20. The peptide of claim 18 or 19, wherein the C-terminal fragment of C-peptide is EGSLQ.

21. Use of a peptide as defined in any one of claims 15 to 20 in the manufacture of a medicament for use in C-peptide based therapy.

22. A pharmaceutical composition comprising a peptide as defined in any one of claims 15 to 20 together with a pharmaceutically acceptable carrier or excipient.

23. The pharmaceutical composition of claim 22 further comprising a C-peptide or C-peptide fragment having C-

peptide activity.

24. A product containing the peptide of claim 1 or any of claims 3 to 14 as dependent on claim 1, together with a peptide having C-peptide activity, as a combined preparation for simultaneous, separate or sequential use in C-peptide based therapy.

25. A product as claimed in claim 24 wherein said peptide having C-peptide activity is a C-terminal fragment of human C-peptide.